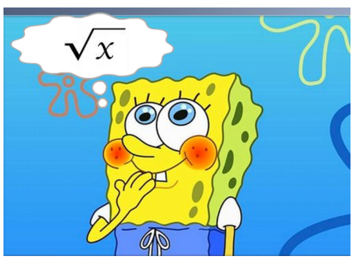
Chapter 6 Square Roots & the Pythagorean Theorem

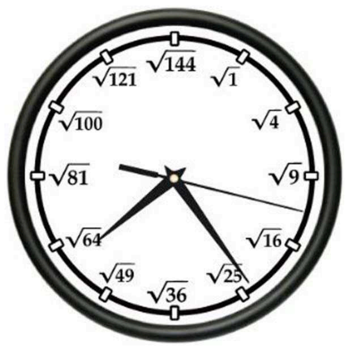
6.3 Activity Estimating Square Roots

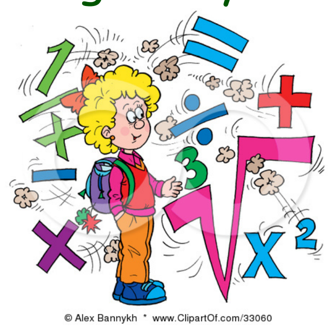
Unit Question: How do we use signs and symbols to help us?

Learner Profile: Inquirer

Area of Interaction: Human Ingenuity







I Can Statement:

I can understand and approximate square roots.

Rational Numbers:

Any two integers written as a fraction is a rational number.

Example: $\frac{7}{4}$ integers

Non Example: $\frac{\sqrt{2}}{3}$

Repeating Decimals are Rational Numbers because they can be changed into a fraction, $\frac{a}{b}$, where $b \neq 0$

Example: $0.\overline{7}$

Let n=0.777...

Then 10n = 7.777...

$$\begin{aligned} 10n &= 7.777\ldots \\ -\ 1n &= 0.777\ldots \\ \hline 9n &= 7 \end{aligned}$$

$$n = \frac{7}{9}$$

You try:

1. $0.\overline{8}$

n=8/9

$100n = 36.3636$
$-\ n = 0.3636$
$99n = 36$
$\frac{99n}{99} = \frac{36}{99}$

2. $0.\overline{36}$

n= 4/11

3. $1.\overline{234}$

1 26/111

4. $0.6\overline{3}$

19/30

$100n = 63.333$
$-10n = 6.333$
$90n = 57 \quad n = \frac{57}{90}$

$100n = 63.333\ldots$
$-n = .633$
$99 = 62.7$
$\frac{62.7}{99} \quad \frac{627}{990}$

Irrational Numbers:

Irrational numbers <u>can't</u> be written as the division of two integers.

What two numbers do you divide to equal this? (None)

Example of an Irrational number: $\sqrt{5}$

Example of a Non irrational number: 1.5

Because $1.5 = \frac{3}{2}$

Irrational Numbers:

Numbers that go on and on and on... after the decimal, with no pattern are also irrational numbers

No pattern after the decimal

Example: 1.732050808...

Non Example: 1.3333333...

Put the numbers into the correct oval.

Irrational

Rational

$\sqrt{7}$

$\sqrt{8}$ $\sqrt{9}$ 3.5 π

Now, quietly work on activity 1 in your journal on page 125

1 ACTIVITY: Approximating Square Roots

Work with a partner.

Archimedes was a Greek mathematician, physicist, engineer, inventor, and astronomer.

a. Archimedes tried to find a rational number whose square is 3. Here are two that he tried.

$$\frac{265}{153} \text{ and } \frac{1351}{780}$$

Are either of these numbers equal to $\sqrt{3}$? How can you tell?

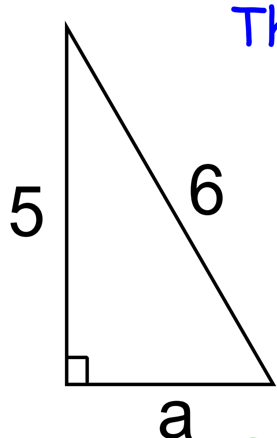
Activity 1, math journal on page 125

b. Use a calculator with a square root key to approximate $\sqrt{3}$.

Write the number on a piece of paper. Then enter it into the calculator and square it. Then subtract 3. Do you get 0? Explain.

c. Calculators did not exist in the time of Archimedes. How do you think he might have approximated $\sqrt{3}$?

Before starting activity 2, review the Pythagorean Theorem



Find the missing length, a

3^2

9

4^2

16

$a^2 + 5^2 = 6^2$

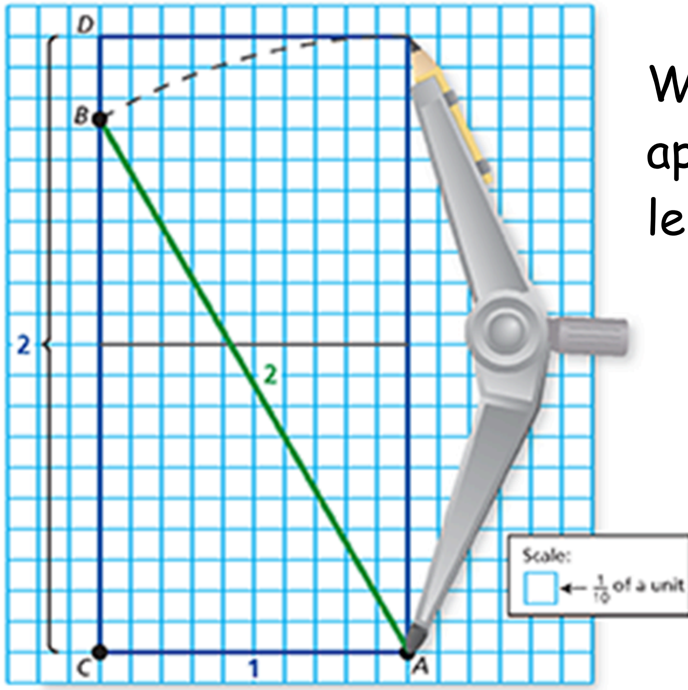
$a^2 + 25 = 36$

$a^2 = 11$

$\boxed{a = \sqrt{11}}$

$a \approx 3$

Activity 2, page 126



What is the approximate length of $\overline{BC}$?

$$(BC)^2 + (AC)^2 = (AB)^2$$
$$(BC)^2 + 1^2 = 2^2$$
$$(BC)^2 + 1 = 4$$
$$(BC)^2 = 3$$
$$BC = \sqrt{3}$$

Now try number 3 on page 127.

What is the approximate value of $\sqrt{5}$?

What Is Your Answer?

4. **IN YOUR OWN WORDS** How can you find decimal approximations of square roots that are irrational?

Assignment

Workbook 6.3p125-127

Textbook p249   5-17 all

Worksheet -Repeating Decimals